

ROMANIA

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Romania's economy continued to contract in 1999 as the gross domestic product declined by 4.8% following a similar decline in 1998. At the same time, industrial output fell by 8.7%, or one-half of the decline registered in 1998 (U.S. Central Intelligence Agency, 2000). Romania's production of metals (aluminum, copper, lead and zinc, manganese, and steel and ferroalloys), industrial minerals, and mineral fuels was mainly of regional importance. In the metals sector, production results for 1999 showed losses for primary copper metal; mine production of lead, and zinc, however, showed some recovery during the year (table 1).

The National Agency for Mineral Resources continued to be responsible for administering the provisions of the mining law, which is centered mainly on the approval and issuance of licenses for exploration for and exploitation of mineral resources in Romania. No legal distinction is made between foreign or domestic companies or nationals. Romania's mining law, which was adopted in September 1998, defines all minerals as the property of the state; this includes water resources, as well as waste and tailings dumps (Hinde, Hall, and Walker, 1999, p. 4). Also, the mining law requires permits for all mineral exploration and mining activities. Mining titles are transferable and may be used as securities with authorization from the Government of Romania. Public bidding for exploration in Romania began following the adoption of the mining law in 1998. Another effect of the new mining law was a legal reaffirmation of the regies autonomes system in the minerals sector. Regies autonomes are state-owned enterprises that included such utilities as telecommunications, the electric power industry, mass transportation, postal services, military industries, and mining and mineral industries. Regies autonomes, although fully owned and operated by the Government, still were able to lease or sell some assets to increase their profitability.

In the minerals sector, eight national regia autonome companies oversee most activities. Compania Nationala REMIN S.A., which was a regia autonome based in Baia Mare, was involved in the production of copper, gold, lead, silver, and zinc in concentrates. REMIN operated 4 divisions that oversaw 18 mines. Production levels in 1999 were in excess of 2 million metric tons per year (Mt/yr) compared with about 5 Mt/yr prior to 1989 (the last year of central economic planning). About 70% of REMIN's output was polymetallic ore, 15%, gold ore; and the balance, copper ore (Hinde, Hall, and Walker, 1999, p. 4). REMIN accounted for 100% of Romania's production of ferroalloys and barite, 75% of zinc, about 65% of lead, more than 50% of gold and silver, and 27% of copper. REMIN's divisions were, Baia Borsa with two mines, Baia Mare with eight mines, Bucovina with four mines, and Rodna with two mines. In addition, there are two open pit iron-manganese mines and two flotation plants.

Compania Nationala Minvest (formerly Deva Copper Enterprise), which was the regia autonome at Deva in the west-central part of the country, produced copper, gold, iron ore, lead, limestone, sand, silver, and zinc from 31 underground mines, 8 open pits, and 26 beneficiation/treatment plants. Copper grades (head grades at underground and open pit mines) ranged from 0.2% to 0.8% copper; gold ranged from 1 to 3 grams per metric ton gold (g/t). In 1999, Minvest produced 14,000 metric tons (t) of copper and 3,000 t of lead and zinc in low-grade concentrates (Hinde, Hall, and Walker, 1999, p. 4).

Other regies autonomes that were concerned with minerals and mining included Societatea Nationala a Carbunelui-Ploiesti, which oversaw the lignite and brown coal industry; Compania Nationala a Huilei-Petrosani, which operated bituminous and brown coal mines; Compania Nationala a Lignitului Oltenia-Targu Jiu, which was involved only in lignite production; and Compania Nationala a Uranului-Bucuresti, which oversaw mine production of uranium. The two remaining regies autonomes oversaw the production of salt and mineral water (International Bank for Reconstruction and Development, 1999).

In 1999, the regies autonomes responsible for the mining sector additionally were instrumental in the Government's plan to restructure fully the country's mining and mineral-processing industries. Generally, as national companies, the regies autonomes would be involved in the eventual closure of 174 unprofitable mines and the reduction and ultimate abolition of state subsidies to the sector through privatization. In 1990, state subsidies to the mining sector amounted to \$528.4 million; in 1995, they declined to \$402.5 million and were expected to decline to \$100 million in 1999.

The Government's principal objectives involved the replacement of its involvement in the mining sector with private sector investment, the establishment of a sound commercial and economic foundation for the mining and processing sector, the implementation of environmentally sustainable mining and mineral-processing activities, and mitigation of social stresses generated by mine closures, partly by revitalizing the local economies of the mining areas. To implement these objectives, an initial phase was undertaken in 1999 as a project underwritten and sponsored by the International Bank for Reconstruction and Development (World Bank). The initial phase would oversee the final closure of 29 underground mines (table 3). The total cost of the phase I project would amount to about \$62 million; of that, foreign and domestic contributions would be \$38 million and \$23 million, respectively. Phase I had several disaggregated components. Mine closure and environmental mitigation would total to \$31.69 million; of that, foreign and domestic contributions would amount to \$17.07 million and \$14.62 million, respectively. Social mitigation would amount to \$18.75, of that, foreign and domestic components would be \$14.12 million and \$4.63 million,

respectively. Institution strengthening (mining cadastre control and mining titles registry, exploration and exploitation concession, inspection, mining law, legal requirements and institutions, environment management and inspection, mining sector investment study, sectoral environmental assessment study) would total \$2.8 million; of that, the foreign component would amount to \$1.84 million (International Bank for Reconstruction and Development, 1999).

The current (1999) law on environmental protection was adopted in 1995. The sections that pertain directly to the minerals industry are articles 14, 16, and 48. Article 14 describes the obligations that new and former owners carry with respect to restoring environmental quality. Article 16 relates to the proscription of imports of raw or processed waste by Romania with the exception of those categories of waste that constitute a useful secondary resource of raw materials. Article 48 establishes procedures for monitoring soil and subsoil quality and included plans for territorial development, geological and hydrogeological prospecting, exploratory drilling, and mining extraction activities (Monitorul Oficial, 1995, p. 1-15).

The Government of Romania announced its intent to privatize fully its aluminum industry, which was operated by ALRO S.A. Slatina and ALPROM S.A. Slatina. To help achieve this end, the Government sought a loan from the World Bank and indicated that bids should be delivered by June 1999 (Mining Journal, 1999d). In 1999, 54% of ALRO stock was owned by the Government, and the balance was owned by foreign and domestic private concerns. With assistance from the World Bank, the State Ownership Fund (SOF) of Romania would administer the sale of assets (Metal Bulletin, 1999m).

In June 1999, Romania announced the approval of a proposed before-sale merger of ALRO and ALPROM by the SOF. The process for selecting an advisor for the proposed privatization of Romania's aluminum industry, however, was suspended after the World Bank intervened to correct unspecified problems in the sale process.

In late 1999, ALRO signed an agreement with Pechiney of France to modernize four potlines at its aluminum smelter. Modernization already had been completed at two other potlines. Moreover, Pechiney was among the prospective bidders for ALRO during the company's privatization program scheduled for sometime in 2000 (Metal Bulletin, 1999j). ALRO also announced plans to increase the production of primary aluminum to 176,000 t in 2000 from about 174,000 t produced in 1999. The company expected aluminum production to increase to 190,000 t in 2003. The increases in aluminum output were to stem largely from technical upgrades, which would raise efficiency and abate pollution (Mining Journal, 1999c).

Romania mined copper largely in the northeastern part of the country, which included mines at Baia Sprie, Cavnic, and Lesul Ursului, and in the southwestern part of the country, which included mines at Moldova Noua, Rosia Montana, and Rosia Poieni. Generally, the grade of ore has been low; major producing mines (Moldova Noua and Rosia Poieni) hoisted ore at a grade of about 0.35% copper or less. Concentrates from these areas have been smelted and refined at Baia Mare and Zlatna. At Baia Mare, Intreprinderea Metalurgica de Metale Neferoase operated an Outokumpu Oy flash smelter, an electrolytic copper refinery, and a continuous caster. At Zlatna, Intreprinderea Metalurgica de Metale Neferoase operated an

Outokumpu flash smelter and an electrolytic refinery to process copper concentrates (Serjeantson, 1995, p. 662).

Major issues in 1999 included the sale of assets of the Phoenix Baia Mare primary copper plant. The sale, which was administered by the SOF, saw the acquisition of 70% of Phoenix's shares by Allied Deals PLC of the United Kingdom for a \$37 million acquisition and investment price, as well as the assumption of the enterprise's debt, which amounted to about US\$30 million. Allied Deal's spokesperson indicated that Allied's initial program for the newly acquired subsidiary, SC Allied Phoenix SA, would involve the refurbishment of the plant's throughput capacity to reattain its 40,000-metric-ton-per-year (t/yr) capacity with an expansion to 60,000 t/yr during the subsequent stage of facility expansion. Phoenix's primary smelter technology used the Outokumpu flash smelting process; feedstock comprised blister, copper concentrate, and scrap anodes total electrolytic copper capacity was about 1,000 metric tons per month. Marketable products included blister copper and standard- and high-grade electrolytically refined copper as billet and slab; gold and silver were produced in a separate plant (Metal Bulletin, 1999a).

Additionally, Allied Deals PLC acquired the Elcond SA Zalau continuous casting rod and wire plant at Zalau (Allied Deals Elcond SA), which had a 40,000-t/yr capacity, for about \$7 million. Most of Elcond's feedstock had been obtained from the Phoenix Baia Mare operation (Metal Bulletin, 1999b, p. 5).

In early 1999, Ferom SA, which was Romania's producer of ferroalloys, ceased production and entered into receivership. In September, the company's ferrosilicon and ferrosilicon-manganese furnaces came under the operation of Ferco Intertrade of Turkey. Later in the year, Ferom's bankruptcy proceedings reportedly were halted with Ferco expressing strong interest in purchasing the plant during its privatization process (Metal Bulletin, 1999f, g).

Australia's Esmeralda Exploration Ltd. announced the startup of the Baia Mare tailings processing project in the second quarter of 1999 with an output by June of 274.3 kilograms (kg) of gold and 412 kg of silver. The processing would start at the 30-year old Meda tailings pond, which contained 4.43 million metric tons (Mt) of solid waste generated by flotation.

The tailings-processing project was conducted under the auspices of Aurul S.A., which was a joint-stock company registered in Romania (50% owned by Esmeralda Exploration Ltd. and 44.8% by REMIN S.A.) would process or retreat tailings and residues from several tailings dams during a 10-year period.

A feasibility study was conducted (drilling and metallurgical analysis) for gold at two dams for a 2.5-Mt/yr carbon-in-leach process to retreat tailings. The analysis at the Sasar Dam showed a recoverable grade of 0.60 g/t gold from 4.4 Mt of tailings, and at the Central Dam, 0.48 g/t gold from 10.5 Mt of tailings. Total recovery from both dams would amount to about 7.8 t. The tailings were to be recovered by a hydraulic monitor, and the slurry would be sent to a new plant next to REMIN's current (1999) flotation plant. The new carbon-in-leach plant, which was designed by Lycopodium Pty. Ltd. of Australia, had a design capacity of about 1.6 t/yr and was expected to have a 63% to 66% rate of recovery. The reprocessed tailings would be pumped to a new plastic-lined tailings dam about 7 kilometers (km) south of Baia Mare (Hinde, Hall, and Walker 1999). Other projects undertaken by Aurul during the year

involved exploration for precious metals that occur in hard rock, mainly at REMIN's 17 exploration areas.

In 1999, Mivest S.A. produced gold from the Cetate open pit mine, as well as the Rosia Montana Mine. Further underground exploratory work at the Cetate Mine, which was undertaken in concert with Gabriel Resources Ltd. of Canada, found gold mineralization associated with brecciated zones within the Cetate and the Cîrnic dacitic intrusives. Further development of the Cetate gold deposit would need foreign investment. Both operations would be closed following the development of these ore bodies by the Mivest-Gabriel joint venture (Gabriel Resources Ltd., 1998, p. 4). Minvest administered operations at the Rosia Poieni Mine (a copper porphyry deposit), which would require substantial investments for new equipment and facility expansion. These would include a heap-leaching operation for about 80 Mt of ore grading 0.25% Cu; the open pit sulfide ore, which amounted to about 350 Mt at a grade of 0.36% Cu, could be used as feedstock at the Phoenix smelter in Baia Mare (Hinde, Hall, and Walker, 1999).

In June 1998, Gabriel and Minvest, in accordance with the Romanian Mining Law, formed Euro Gold Resources S.A., a joint stock company, to explore, develop, and operate the Bucim and Rosia Montana properties. Initially, the share ownership profile was Gabriel, 65%; Minvest, 33.8%; and three other state-owned Romanian mining companies, 1.2%. Additionally, Gabriel was to have the right to increase its holding to 80% following the completion and delivery of a prefeasibility study on the Rosia Montana project. Deva Gold also was a joint venture, which had been formed in March 1998 by Castle Europa (a Gabriel subsidiary with 60% of the shares); Minvest (38.5%), and three other state-owned Romanian companies (1.5%) to explore, develop, and exploit the Certej and the Zlatna properties. Castle Europa may increase its shares to 80% of the total following the completion and delivery of a prefeasibility study. With respect to the Bolcana and the Baita-Craciunesti properties, which were adjacent to the Certej property, with prospective copper- and gold-bearing porphyry deposits, the exploration rights that earlier had been granted to Minvest were transferred to Deva Gold (Gabriel Resources Ltd., 1999). In the Minvest-Gabriel joint-venture agreement, Minvest granted Gabriel the right to recoup all of its preproduction spending before paying out moneys to Minvest (Clifford, 1999).

The six aforementioned mineral properties are located in what is referred to as the "Golden Quadrilateral," which is a mining region in the Apuseni and the Metaliferi Mountains in the Transylvanian District of Romania, which covers an area of about 500 square kilometers (km²) directly north of the city of Deva. This region, known in classical antiquity as Dacia, was a producer of gold and silver and was conquered by Rome in the early second century. Mining that was undertaken from the late classical through the Medieval period, however, was discontinuous. Mining was systematically undertaken only when the region became part of the Austro-Hungarian Empire (from the end of the 17th century until the early 1900's), as attested by hundreds of kilometers of underground workings. Extensive underground workings also were developed and exploited by the Government of Romania under the central economic planning system from 1960 through 1990 (Gabriel Resources Ltd., 1998, p. 4). The porphyry and related base-metal vein deposits in this region are associated with subvolcanic intrusions. For example, Rosia Montana displays

gold mineralization in two hydrothermally altered subvolcanic dacite intrusives in sequences of metasediments and volcanosediments of Cretaceous origin, which cover a surface area of 3 by 3.5 km. The mineralized gold and silver zones are described as epithermal to mesothermal, low sulfur, and not showing such potentially hazardous material as antimony, arsenic, and telluride minerals (Gabriel Resources Ltd., 1998).

The 1998 resource estimate at the Cetate and the Cîrnic (within Rosia Montana) deposits was undertaken by Resource Service Pty. Ltd. of Australia on behalf of the Minvest-Gabriel joint ventures. Given a cut-off grade of 0.8 g/t gold and a block size of 10 by 10 by 10 meters (m), measured resources at Cetate averaged 1.6 g/t gold and 10 g/t silver; indicated resources at Cîrnic were 1.8 g/t gold and 12 g/t silver (Gabriel Resources Ltd., 1998).

In September 1999, Euro Gold announced the discovery of a "new high grade zone of gold mineralization" at the Igre-Jig-Valdoaia deposit, which is part of Rosia Montana. The zone was delineated after 3,000 samples were obtained from underground levels and surface outcrops. Additionally Euro Gold was granted exploration rights on a 10.5-km² area adjacent to the Balcana copper-gold deposit where Euro Gold has had mining rights for 20 years (Mining Journal, 1999a). On balance, geologic work by yearend revealed a significant increase in Rosia Montana's resources (table 4).

Other developments in Romania's gold mining sector involved the granting of exploration licenses by the Government to Minera Andes Inc. of Spokane, Washington, in the 49-km² section of the Golden Quadrilateral, known as the Voia area, and in the 181-km² Ostoros area in central Romania's Carpathian region. The exploration permits allowed Minera Andes to do all work necessary, which included feasibility studies. The Voia area is reported to have intense "widespread alteration" with epithermal precious and base-metal occurrences. The Ostoros area was described as having volcanic rocks with caldera features; hydrothermal alteration zones and occurrences of precious metals have been described by Romanian Government geologists; as of 1999, this area has not been fully explored. To operate in this region, Minera Andes formed Transylvania Gold SLR, which was a wholly owned subsidiary (Mining Journal, 1999b).

Romania's privatization of the steel industry was a slow, and at times, uneven process given the many, sometimes unclear, governmental lines of authority. In view of these circumstances and a weakening world steel market by 1998, only modest privatization had been attained. In mid-1998, the management of Siderica SA Calarasi announced the company's privatization. The bidding process was conducted under the auspices of the SOF and included bids submitted by June 1 by Ispat Industries Ltd., Ispat International N.V., and Voest Alpine Stahl AG (VA Stahl). The SOF was to name the winner or invite the bidders to enter into direct negotiations (Metal Bulletin, 1998d). Otelinor S.A. Targoviste, which was the country's producer of stainless steel, and Laminorul SA Focsani, which was a bar and sections rerolling plant, were privatized (Metal Bulletin, 1998b). Focsani was purchased by Metanef SA, which was a Bucharest-based steel trader (Metal Bulletin, 1998c).

In 1999, Romania's steel industry faced a number of difficult issues, which included the blockage of the Danube in the early part of the year as a result of the war in the Balkans and a rail strike at yearend. Both actions placed a significant burden on

Romania's steel exports (Metal Bulletin, 1999i, k). To accelerate entry into the European Union (EU), Romania's Ministry of Trade and Industry announced plans to cut total steel production capacity from 8 Mt/yr to less than 7 Mt/yr, especially at steel mills in which the Government was a majority shareholder (Metal Bulletin, 1999o).

In 1999, the SOF reported renewed efforts to privatize Romania's steel industry. The SOF indicated that it planned to sell off the remaining shares of Otelinox's stainless cold-rolled strip rolling mill. About 51% of the stock had been sold to Samsung Deutschland in 1997. The SOF retained 10% of the stock and sold 39% to a variety of other investors. Although Samsung had not indicated an interest in obtaining the SOF's remaining shares, the company did indicate that it spent \$4 million during 1998-99 for production capacity expansion (Metal Bulletin, 1999q).

The SOF's efforts on behalf of Sidex Galati S.A. involved allowing the capital value of Sidex to almost double by combining the value of the enterprise's land with that of the surface facilities. The SOF also reviewed bids from a number of financial institutions to handle the sale of Sidex with the participation of the World Bank. The Balli Group of the United Kingdom was among the leading parties interested in acquiring control of Sidex (Metal Bulletin, 1999c, n). In October, the management of Sidex announced plans to reduce its workforce by one-half (15,000 from 30,000 employees) to increase the enterprise's financial viability in preparation for privatization. At the request of parties interested in the acquisition of Sidex, the workforce reduction would take place before the company's stock offering. Additional cost-reduction considerations included the closure of a number of unspecified facilities at Sidex owing to their underutilization and unprofitability (Metal Bulletin, 1999r).

During most of the year, negotiations were conducted between VA Schienen, which was VA Stahl's rail division, and the SOF about the sale of the Siderca S.A. Calarasi steelworks. The chief interest of VA was in acquiring Calarasi's rail division, and that of the SOF was to sell the entire steelworks. VA indicated that the rail division would be readily profitable given the Romanian State Railway's plan to expand the country's rail network, which could absorb up to 70% of 100,000 t/yr of rail production; additionally, the balance (30%) would be exported (Metal Bulletin, 1999g, s). In September, however, all negotiations were frozen and all operations at Calarasi stopped following a merger of a local bank that had been financially servicing Siderca Calarasi's operations and the main State Bank of Romania. A transfer of accounts to the State Bank revealed a debt that totaled more than \$100 million (funds used mainly for modernization) (Metal Bulletin, 1999p).

The SOF also announced its decision to offer about 95% of the equity in the CSR Resiã steelworks for sale. Resiã had the capacity to produce 359,000 t/yr of sections and 130,000 t/yr of heavy plate. The plant operated a blast furnace and an open hearth furnace (Metal Bulletin, 1999e).

In October, Duferco of Switzerland finalized a contract with the private owners of Societ. Petrotub SA Roman, which was a 300,000-t/yr producer of seamless tubes and pipes (carbon and stainless), to acquire controlling interest in the company (70%). Duferco, which already had acquired controlling interest in Silcotub SA Iaã (a tube and pipe producer), announced plans to

launch a \$30 million restructuring and modernization program for Petrotub and Silcotub, as well as their reorganization into Tubeman International Ltd., which was a holding company whose majority share owner was Duferco (Metal Bulletin, 1999d). The following month, however, the Government of Romania launched an investigation of the sale, which allegedly could give Duferco a monopoly position in Romania's pipe and tube market. According to spokespersons at Romania's Ministry of Industry, the transaction would give Duferco 85% of the domestic market for seamless pipe. No decision was expected until after yearend (Metal Bulletin, 1999e).

New production capacities at Romania's steel plants included plans by Siderurgica SA Hunedoara to install a high-speed 300,000-t/yr Danieli wire rod mill. Work on the project began late in 1998, and completion was expected by early to mid-2000. The mill will produce low-, medium-, and high-carbon and alloy grades of steel, which included ball-bearing steel. Hunedoara also planned to complete the installation of a 400,000-t/yr continuous caster by yearend 1998 and a 550,000-t/yr electric arc furnace by late 1999 (Metal Bulletin, 1998a).

At midyear, Hunedoara, which was also Romania's major producer of long products, announced the closure of its last open hearth furnace at midyear, which would be replaced by a Mannesmann Demag 100-t electric-arc furnace, with 550,000-t/yr capacity; a 450,000-t/yr Mannesmann Demag continuous caster was commissioned at yearend 1998. Hunedoara's future configuration would be that of a minimill that produced carbon, alloy, and special steels, as well as some stainless steel (Metal Bulletin, 1999h).

Lead and zinc ore at a grade of from 0.4% to 1.0% lead and 0.6% to 1.2% zinc was produced at underground mines in the Baia Mare, the Borsa, the Certej, and the Rodna districts. Moreover, Romania's lead and zinc ores also contained copper (0.35%), as well as associated antimony, bismuth, cadmium, gold, and silver. Owing to the complex mineralogy of the lead and zinc ores, concentrates produced from them had a wide range of contained metal. Metal recovery in concentrate reportedly has ranged between 50% and 75% for lead and zinc. Smelting and refining of lead and zinc from domestic and imported ores and concentrates was carried out at the Sometra S.A.'s (formerly Intreprinderea Metalurgica de Metale Neferoase) Imperial Smelter at Copsa Mica, which had capacities to produce about 42,000 t/yr of lead and 66,000 t/yr of zinc.

In midyear, the SOF announced plans to sell 60% of the stock of Sometra's lead and zinc smelter with provisions aimed at upgrading the smelting technology and improving the environmental effects of the operation. In November, major investment in Sometra was announced as the Mytilineos S.A. Group of Greece instituted an investment program for yearend 1999 of \$3 million to modernize the company's smelters and install new water purification and environmental control systems. An additional \$3 million also was earmarked for other equipment modernization by yearend 1999. Mytilineos had acquired a 60% stake in Sometra at the end of 1998 and increased its stake to 88% in 1999. Plans were announced to allocate \$16 million between 1999 and 2002 for further facility expansion (Mining Magazine, 1998, 1999).

Romania's Government-owned Regia Autonoma a Metalelor Rare has mined uranium underground in the Apuseni Mountains near Baita Bihor since 1980. Reportedly, total mine production

in 1994 was about 125 t of uranium oxide contained in 110,000 t of ore. The country's production of uranium has been earmarked for use in at the Cernavoda nuclear powerplant upon its completion. All Romania's uranium ore was designated for shipment to the Feldiora mill in Brasov for processing, which used an alkaline-based circuit to produce a uranium concentrate with a 60% uranium content. The concentrate is further treated to produce a sintered uranium oxide that is suitable for fabrication into fuel. The Government of Romania established the Compania Nationala a Uraniuului, which initially was a state-owned, registered shareholding company that eventually would replace the Regia Autonoma a Metalelor Rare. The new company was to have financial autonomy with initial capital amounting to \$23 million and would assume the rare metal assets, as well as the liabilities, of Regia Autonoma a Metalelor Rare (Mining Journal, 1997).

Romania had four enterprises that produced flat glass; their combined capacity amounted to 78 million square meters per year (385,000 t/yr). The combined output from these plants, however, was about one-third that capacity. The Buzau glass plant, which was the only flat glass producing enterprise, was in Prahova County in Scaieni; this operation, however, was closed in 1999 because of modernization work. The most recent flat glass output data, which was for 1998, gave combined output of sheet and rolled glass at 25,536,000 square meters (127,680 t). The expansion of float glass capacity at the Buzau glass plant upon completion would be about 200 metric tons per day (t/d) (73,000 t/yr) from 150 t/d (55,000 t/yr) (Glass International, 1999).

The trend of cement plant acquisitions by EU companies in the Balkan and the Central European regions also extended to Romania from 1996 through 1999. Major acquisitions included the purchases of the Romcim SA and Cimentul SA Turda cement plants by Lafarge of France and Holderbank Financiere Glaris Ltd. Lafarge Romcim was established following the acquisition of 51% of Romcim shares of stock by Lafarge, which was valued at about \$200 million. Romcim, which was the largest of Romania's six cement-producing enterprises, covered more than 41% of the domestic market. The enterprise comprised four cement plants in Asled, Hoghiz, Medgidia, and Tigru Jiu. The largest of these was the Medgidia plant with a capacity of 2.5 Mt/yr (Industrial Minerals, 1997b; Ouatu, 2000). Similarly, Holderbank acquired controlling interest in Cimentul SA Turda, which was valued at a significantly lesser amount (\$11.5 million) than that of the Lafarge Romcim transaction. Cimentul, which was Romania's smallest cement-producing enterprise, accounted for less than 7% of domestic cement supply. Cimentul combined cement, gypsum, and lime operations and was located approximately 30 km southeast of Cluj-Napoca in the northern part of the country (Industrial Minerals, 1997a). The company produced about 800,000 t/yr of portland cement and 100,000 t/yr of white cement.

In late 1999, Holderbank acquired the Alesd cement plant from Lafarge Romcim, which was a dry-process 450,000-t/yr cement producer (about 10% of the Romanian market), as well as 98.5% of the shares of Cimusa SA, which was another Romanian cement producer. Cimusa SA, which was located near Bucharest, also was a dry-process producer and had a 1.7-Mt/yr capacity (International Bulk Journal, 2000; ODDO EQUITES, 2000).

Romania's energy sector continued to be the responsibility of the Ministry of Industries, the Regies autonomes, and commercial companies. The responsibilities of the Ministry of Industries included the formulation of strategic decisions regarding the country's energy needs. The Regies autonomes were largely responsible for the production and supply of energy products; commercial companies, which were joint-stock entities, often provided such support activities to the sector as vehicles for joint ventures with other domestic and foreign commercial entities.

The petroleum production and refining industry historically has been among Romania's leading industrial sectors. Although small by world standards, the petroleum industry continued to be an important component of the country's energy balance. Estimates of petroleum resources have ranged from 1.0 to 1.6 billion metric tons (Gt). The extraction of crude petroleum in recent years, however, has exhibited a declining trend. Petroleum output in 1996, 1997, 1998, and 1999 declined by 3%, 2%, 3%, and 2%, respectively, compared with preceding years (table 1). A small increase in petroleum production in the near future, however, was anticipated owing to the opening of 15 petroleum and natural gas blocks in 1996 for exploration by such foreign oil companies as BP Amoco of the United States, the Royal Dutch Shell Group of the Netherlands, and Enterprise Oil plc of the United Kingdom (Lynch, 1999). The country's refining capacity amounted to about 25 Mt/yr.

Major events in the petroleum and natural gas sector in late 1999 included the linkage of Romania's natural gas transportation system with that of Ukraine. Romgaz, which was the state-owned gas company, would receive Russian gas through the linkage to increase energy supplies to the northern part of the country. Also, a feasibility study, which was undertaken by experts from Romania and the United States, reached a conclusion that a 1,400-km petroleum pipeline that linked Constanta and Trieste was feasible. The proposed pipeline's designed carrying capacity would be 47.1 Mt/yr, and a completion date was projected for the third quarter of 2002. The pipeline would cost \$1 billion with an additional sum of \$300 million projected for improvements during the initial 10 years of the pipeline's operation. The pipeline would be in a position to carry crude petroleum, originating from the Caspian Sea area, to Trieste where linkage with the trans-Alpine pipeline would be possible (Petroleum Economist, 2000).

Coal was produced at 34 mines from resources that amounted to 3.5 Gt, of which 75% was lignite; 22%, bituminous coal; and 3%, brown coal. Coal accounted for about 60% of the primary fuel for the country's principal electric power stations (Lynch, 1999).

Romania's inland transportation system consisted of 85,798 km of railroads, highways, and inland waterways. The railroad system consisted of 10,860 km of 1.435-m-gauge track and 45 km of broad-gauge track; 3,411 km of track was electrified, and 3,060 km was double track. The highway and road system consisted of 35,970 km of paved roads, 27,729 km of roads surfaced with gravel and crushed stone, and 9,100 km of unsurfaced roads. The country's inland waterways (Danube) consisted of 1,724 km with riverine ports at Drobeta-Turnu Severin, Giurgiu, and Orsova. Sea ports on the Black Sea coast were Braila, Constanta, Galati, and Mangalia. Romania's merchant fleet consisted of 262 ships with a total weight of 5.2 million dead-weight tons. Additionally, crude petroleum was

carried in 2,800 km of pipeline; refined petroleum products, in 1,429 km of pipeline; and natural gas, in 6,400 km of pipeline.

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TABLE 1
ROMANIA: PRODUCTION OF MINERAL COMMODITIES 1/ 2/ 3/

(Metric tons unless otherwise specified)

Commodity	1995	1996	1997	1998	1999
METALS					
Aluminum:					
Bauxite, gross weight	175,000	174,500	127,450	161,865 r/	--
Alumina, calcined, gross weight	322,774	260,637	281,636	250,226 r/	277,388
Ingot including alloys:					
Primary	140,500	140,874	162,987	174,038	174,452
Secondary	3,446	3,678	2,042	1,110 r/	146
Total	143,946	144,552	165,029	175,148 r/	174,598
Bismuth, mine output, Bi content e/	40	40	40	40	40
Cadmium metal, smelter	5	5	5	-- r/	--
Copper:					
Mine output, Cu content of concentrate	24,520	24,434	23,190	19,065 r/	16,807
Metal:					
Smelter:					
Primary	23,355	32,622	25,024	18,708	24,010
Secondary e/	1,000	1,000	1,000	1,000	2,000 4/
Total	24,355	33,622	26,024	19,708	26,010
Refined:					
Primary	22,013	29,305	22,912	21,008 r/	20,294
Secondary e/	5,000	5,000	4,000	2,000	4,000 4/
Total	27,013	34,305	26,912	23,008 r/	24,294
Gold, mine output, Au content e/ kilograms	4,000	4,000	3,500	3,500	3,500
Iron and steel:					
Iron ore:					
Gross weight thousand tons	565	860	565	350 r/ e/	270 e/
Metal content do.	147	140	147	85 r/	71
Metal:					
Pig iron do.	4,203	4,025	4,557	4,541 r/	3,006
Ferroalloys:					
Ferchromium	15,053	9,650	950	873 r/	--
Ferrosilicon	19,320	23,827	9,620	5,553 r/	5,000 e/
Ferromanganese	28,410	20,150	11,505	4,170 r/	25 e/
Ferrosilicomanganese	57,149	78,590	62,570	83,617 r/	550 e/
Silicon metal e/	300	300	300	150 r/	--
Steel, crude thousand tons	6,557	6,082	6,674	6,336 r/	4,355
Semimanufactures:					
Pipes and tubes do.	546	591	633	661 r/	348
Rolled products do.	4,959	4,479	4,804	4,391 r/	3,377
Lead:					
Mine output, Pb content of concentrate	23,194	21,356	19,447	15,144	20,484
Smelter, primary e/	12,000	12,000	10,000	10,000	15,000
Refined: e/					
Primary	22,000	20,000	18,000 r/	20,000	20,000
Secondary	4,000	4,000	4,000	4,000	3,000
Total	26,000	24,000	22,000 r/	24,000	23,000
Manganese:					
Ore, gross weight e/ thousand tons	130 4/	150	100	100	60
Concentrate: 5/					
Gross weight do.	104	104	68	73 r/ e/	42 e/
Mn content do.	27	26	17	19 r/	11
Silver, mine output, Ag content e/	60	60	60	60	50
Zinc:					
Mine output, Zn content of concentrate	34,730	32,082	31,737	25,620	28,107
Metal, smelter, primary and secondary	28,331	28,162	30,226	29,427	25,000
INDUSTRIAL MINERALS					
Barite, processed	18,169	12,541	12,729	10,327 r/	4,641
Cement, hydraulic thousand tons	6,842	6,956	7,298	7,300 r/	6,252

See footnotes at end of table.

TABLE 1--Continued
ROMANIA: PRODUCTION OF MINERAL COMMODITIES 1/ 2/ 3/

(Metric tons unless otherwise specified)

Commodity	1995	1996	1997	1998	1999	
INDUSTRIAL MINERALS--Continued						
Clays:						
Bentonite:						
Run of mine e/	100,000	100,000	60,000	60,000	45,000	
Marketable	42,277	43,543	27,133	25,434 r/	19,609	
Kaolin:						
Run of mine e/	150,000	145,000	90,000	75,000 r/	73,000	
Marketable	49,024	45,200	29,169	24,742 r/	23,586	
Diatomite	49,790	56,906	23,880	34,600 r/	11,592	
Feldspar	30,920	34,975	25,962	37,010 r/	36,635	
Fluorspar e/	15,000	15,000	15,000	15,000	15,000	
Graphite	2,179	2,931	2,563	1,951 r/	1,041	
Gypsum	thousand tons	111	91	79	297 r/	305
Lime	do.	1,763	1,748	1,599	1,813 r/	1,464
Nitrogen, N content of ammonia	do.	1,487 r/	1,513 r/	781 r/	378 r/	686
Pyrites, gross weight	do.	388 r/	168 r/	208 r/	200 r/	68
Salt:						
Rock salt	do.	669	808	254	68 r/	100 e/
Other	do.	1,820	1,881	2,369	2,220 r/	2,199
Total	do.	2,489	2,689	2,623	2,288 r/	2,300 e/
Sand and gravel	do.	901	907	711	1,049 r/	748
Sodium compounds, n.e.s.:						
Caustic soda	do.	383	326	322	310 r/	289
Soda ash, manufactured, 100% Na ₂ CO ₂ basis	do.	504	537	548	482 r/	431
Sulfur:						
S content of pyrites	do.	97	42	52	50	17
Byproduct, all sources	do.	59 r/	68 r/	43 r/	46 r/	45
Total	do.	156 r/	110 r/	95 r/	96 r/	62
Sulfuric acid	do.	477	422	330	229 r/	234
Talc	do.	9,976	10,248	7,578	8,134 r/	8,289
MINERAL FUELS AND RELATED MATERIALS						
Carbon black	do.	21,555	26,023	21,400	18,450 r/	12,490
Coal, washed:						
Anthracite and bituminous:						
For coke and semicoke production	thousand tons	349	312	324	192 r/	110
For other uses	do.	800 e/	10	10	2 r/	1
Brown	do.	--	1,000	692	-- r/	--
Lignite	do.	39,979	40,546	32,281	26,037 r/	22,472
Total	do.	41,128	41,868	33,307	26,231 r/	22,583
Coke:						
Metallurgical	do.	3,164	2,948	3,110	2,929 r/	1,593
Other	do.	220	1	1	--	--
Total	do.	3,384	2,949	3,111	2,929 r/	1,593
Gas, natural, gross:						
Associated	million cubic meters	1,410	1,361	1,245	1,210 r/	1,164
Nonassociated	do.	17,606	16,801	14,671	13,231 r/	13,413
Total	do.	19,016	18,162	15,916	14,441 r/	14,577
Petroleum:						
Crude:						
As reported	thousand tons	6,717	6,626	6,515	6,309 r/	6,154
Converted	thousand 42-gallon barrels	50,270	49,400	48,760	47,020 r/	45,866
Refinery products e/	do.	145,000	132,000	125,000	95,000 r/	77,265 4/

e/ Estimated. r/ Revised. -- Zero.

1/ Includes data available through January 2001.

2/ Estimated data are rounded to no more than three significant digits; may not add to totals shown.

3/ In addition to the commodities listed, antimony, asbestos, and a variety of crude construction materials are produced, and molybdenum may have been produced as a byproduct of copper from 1988 on; output is not reported quantitatively; and available information is inadequate to make reliable estimates of output levels.

4/ Reported figure.

5/ Estimated series were based on published data on concentrate production.

TABLE 2
ROMANIA: STRUCTURE OF THE MINERAL INDUSTRY IN 1999

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies (Government-owned unless otherwise specified)	Location of main facilities	Annual capacity
Alumina	Soc Com Alor SA	Plant at Oradea, near Hungarian border	250
Do.	Soc Com Alor SA (51%-owned by the Balli Group of the United Kingdom and the Bayrakter Co. of Turkey)	Plant at Tulcea, Danube Delta	400
Aluminum, primary	Alro SA (Slatina Aluminium Enterprise)	120 kilometers west of Bucharest	270
Barite	Ministry of Industry	Ortra mine, Rosia Montana, southwest of Cluj	100
Bauxite	do.	Oradea-Dobresti Mining Complex, near Hungarian border	350
Cement	Cimentul SA Turda	Plant at Turda, 600 kilometers from port of Constanta	cement: 1,360 clinker: 850
Do.	Cimentul SA Cimus	Plant at Cimpulung, about 499 kilometers from port of Constanta	cement: 2,200 clinker: 1,360
Do.	Moldocim SA Bicaz	Plant at Bicaz, about 450 kilometers from port of Constanta	cement: 3,100 clinker: 1,520
Do.	Romcif SA Fieni	Plant at Fieni, about 420 kilometers from port of Constanta	cement: 1,600 clinker: 960
Do.	Romcim SA	Plant at Alesd, 812 kilometers from port of Constanta	cement: 3,500 clinker: 2,120
Do.	do.	Plant at Hoghiz, 437 kilometers from port of Constanta	cement: 2,200 clinker: 1,520
Do.	do.	Medgidia plant, about 35 kilometers west of Constanta	cement: 3,500 clinker: 1,980
Do.	do.	Plant at Jiu, about 533 kilometers from the port of Constanta	cement: 3,000 clinker: 2,045
Coal:			
Bituminous	Compania Nationala a Huilei-Petrosani	Valea Jiului Mining Complex, near Hunedoara	10,400
Lignite	Societatea Nationala a Lignitului Oltenia-Targu-Jiu	Jiu Valley, Oltenia County, north of Craiova	20,300
Do.	Societatea Nationala a Carbunelui-Ploiesti	About 50 kilometers north of Bucharest	8,700
Copper:			
Ore (concentrate)	Compania Nationala REMIN S.A. and Compania Nationala Minvest	Baia Mare, Baia-Sprie, and Cavnic mines, northwestern area near the Ukrainian border; Rosia Montana, Noua, Borsa Balan, and Lesul-Ursului Mines--in east-west arc along Carpathian range; Rosia Poieni Mine; and Moldova Noua Mine, southwest near Danubian border with Yugoslavia	180
Metal	Compania Nationala REMIN S.A.	Outokumpu flash smelter and electrolytic refinery at Baia Mare in the Northwestern area, near the Ukrainian border	35
Do.	do.	Zlatna smelter and refinery, Apuseni, northwest Romania	13
Ferroalloys	Ferom-Joint Stock Co.	Complex at Tulcea	280
Iron ore	Compania Nationala Minvest	Mining complex at Hunedoara, in west-central Romania	1,320
Do.	do.	Resita Mining Complex, southwestern Romania, near Yugoslav border	660
Do.	do.	Napoca-Cluj Mining Complex, northwestern Romania on the Somesul River	990

TABLE 2--Continued
ROMANIA: STRUCTURE OF THE MINERAL INDUSTRY IN 1999

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies (Government-owned unless otherwise specified)		Location of main facilities	Annual capacity
Lead in ore	Compania Nationala REMIN S.A.		Baia Mare Mine, near Ukrainian and Hungarian borders	24
Do.	Compania Nationala Minvest		Balan Mine, 50 kilometers southwest of Piatra Neamt	10
Lead metal	Sometra S.A.		Imperial Smelter at Copsa Mica, central Romania, on the Tirnava Mare River	42
Natural gas million cubic feet per year	Ministry of Industry, Department of Energy		Tirgu Mures Field at Tirgu Mures, north-central Romania	996,000
Do.	do.	do.	Ploesti Field, 50 kilometers north of Bucharest	249,000
Petroleum, crude barrels per day	do.		Ploesti-Teleajen, Pitesti, and Tirogoviste Fields, in Prahova Valley around Bucharest; Bacau Field at Bacau, east-central Romania near the Siretul River; and West Carpathian Field, southeastern Carpathian Mountains, between the west bank of the Olt River and Targu Jiu	250,000
Petroleum, refined	do.	do.	Refineries at Brazil, Pitesti, Onesti, Barcau, Borzesti, Brasov, Cimpina, Darmanesti, Oradea, Ploesti, Teleajen, and Navodari	664,000
Steel	ESteel Siderurgica Romana SA Otel Rosu		Caras-Severin, southeastern region, near Yugoslav border	400
Do.	SC Industrie Sarnei SA		Campia Turzii, Cluj, northwestern Romania	300
Do.	Sidex SA Galati		Danube River, north of Brail, near the Ukrainian border	10,000
Do.	Siderurgica SA Hunedoara		West-central Romania, near Calan	2,135
Do.	CSR SA Resita		Southwestern Romania, about 20 kilometers southwest of Caransebes	1,200
Do.	Siderica SA Calarasi		Near the Bulgarian border close to the Danube	2,200
Do.	COST SA Tirogoviste		Tirogoviste, Dimbovita, near Bucharest	1,100
Zinc in ore	Compania Nationala Minvest		Baia Mare, near Ukrainian and Hungarian borders	60
Zinc metal	Sometra S.A.		Imperial Smelter at Copsa Mica, Tirnava River, central Romania	66

TABLE 3
ROMANIA: MINE CLOSURES FROM 1990 THROUGH 1999

Name of company and mine	Mineral(s)	Location	Year of closure	Closure cost 1/ (U.S. dollars)
Compania Nationala REMIN S.A.:				
Lesu Ursului (Piriul Ciinelui)	Copper	Suceava	Before 1997	290,000
Lesu Ursului (Piriul Ursului Isipoaia)	do.	do.	do.	290,000
Lesu Ursului South (Pazdra)	do.	do.	do.	189,000
Magura II (Baia Borsa)	Polymetallic	Maramures	do.	199,400
Burloia Vest Arinis	do.	do.	do.	29,200
Burloia Central (south & east)	do.	do.	do.	796,000
Burloia (Dealul Bucatii Vest)	Copper	do.	do.	182,100
Compania National Minvest:				
Ruschita (Virful Boului)	Iron ore	Caras-Severin	do.	583,200
Ruschita (Piriul cu Raci)	do.	do.	do.	79,300
Compania Nationala a Lignitului Oltenia-Targu-Jiu:				
Rosiuta II	Lignite	Gorj	In 1997	66,300
Lupoia I	do.	do.	Before 1997	380,200
Rogejulu P3	do.	do.	In 1997	466,500
Barbesti	do.	Vilcea	Before 1997	532,800
Cucesti	do.	do.	do.	283,600
Cerna	do.	do.	do.	269,300
Armacesi	do.	do.	In 1997	76,200
Slanic (N&S, 2 mines)	do.	Arges	Before 1997	1,055,200
Godeni	do.	do.	do.	863,200
Aninoas	do.	do.	do.	2,599,300
Berevoesti	do.	do.	Operating	573,600
Societatea Nationala a Carbunelui-Ploiesti:				
Vernesti	Brown coal	Bacau	In 1997	1,895,000
Rafira-Lumina	do.	do.	do.	5,536,000
Leorda East	do.	do.	do.	1,537,000
Virghis	Lignite	Covasna	Before 1997	272,000
Bodos	do.	do.	In 1997	1,515,000
Baraolt 1 East	do.	do.	Before 1997	301,500
Magureni-Tufeni	do.	Prahova	do.	460,500
Margineanca-Veche	do.	do.	In 1997	1,474,000

1/ Estimated, based on US\$1=8150 leu, as of December 31, 1997.

Source: International Bank for Reconstruction and Development, 1999, Romania--Mine closure and social mitigation project, project appraisal document: International Bank for Reconstruction and Development, August 12, R99-161 [PAD], 65 p., p. 36-37.

TABLE 4
ROMANIA: GOLD AND SILVER RESOURCES AT ROSIA MONTANA IN 1999 1/

Cutoff grade (copper)	Class	Ore (thousand metric tons)	Grade (gold, grams per metric ton)	Gold in ore (thousand troy ounces)	Grade (silver, grams per metric ton)	Silver in ore (thousand troy ounces)
0.8	Measured	42,110	1.8	2,436	11	14,893
	Indicated	60,040	1.6	3,116	8	16,035
	Inferred	41,840	1.7	2,258	10	12,941
	Total	143,990	1.7	7,761	10	44,259
1.0	Measured	34,610	2.0	2,171	12	13,156
	Indicated	46,080	1.8	2,714	9	13,052
	Inferred	31,870	1.9	1,973	10	10,747
	Total	112,560	1.9	6,858	10	36,955
1.3	Measured	28,350	2.1	1,952	12	11,292
	Indicated	35,380	2.1	2,338	9	10,573
	Inferred	25,390	2.1	1,743	11	9,014
	Total	89,120	2.1	6,033	11	30,879

1/ DUNDEE Securities Corporation, 1999, Gabriel Resources Ltd.: Investment Research, October 6, 8 p. According to this source, drilling was expected to be completed by July 2000.